

# PREPARATION FOR AIRLIFT MOVEMENT



UMODD04  
TBOLC 500-500-

# Objective



- Know the pertinent procedures/requirements and be able to successfully deploy your unit by air

# References

DOD 4500.0-R, DTR, Part III, *Mobility*

FM 55-9, *Unit Air Movement Planning*

FM 3-35.4, *Deployment Fort-to-Port*

FORSCOM/ARNG Reg 55-1, *Unit Movement Planning*

# Outline

- Unit Preparation for Air Movement
- Preparing Personnel for Air Movement
- Equipment Preparation and Joint Inspection
- Center of Balance



# Unit Preparation for Air Movement



# UMO - General Responsibilities

- **UMO:**
  - Coordinates unit airlift planning and preparation activities
    - + Includes coordination with higher headquarters & UMC for unit support & procedures during movement to and processing at APOE.
    - + Primary objective is to minimize the time a unit being moved is non-operational

# Deployment Box

Manuals / CD's

Measuring tape

Duct tape

Grease pencils

Calculators

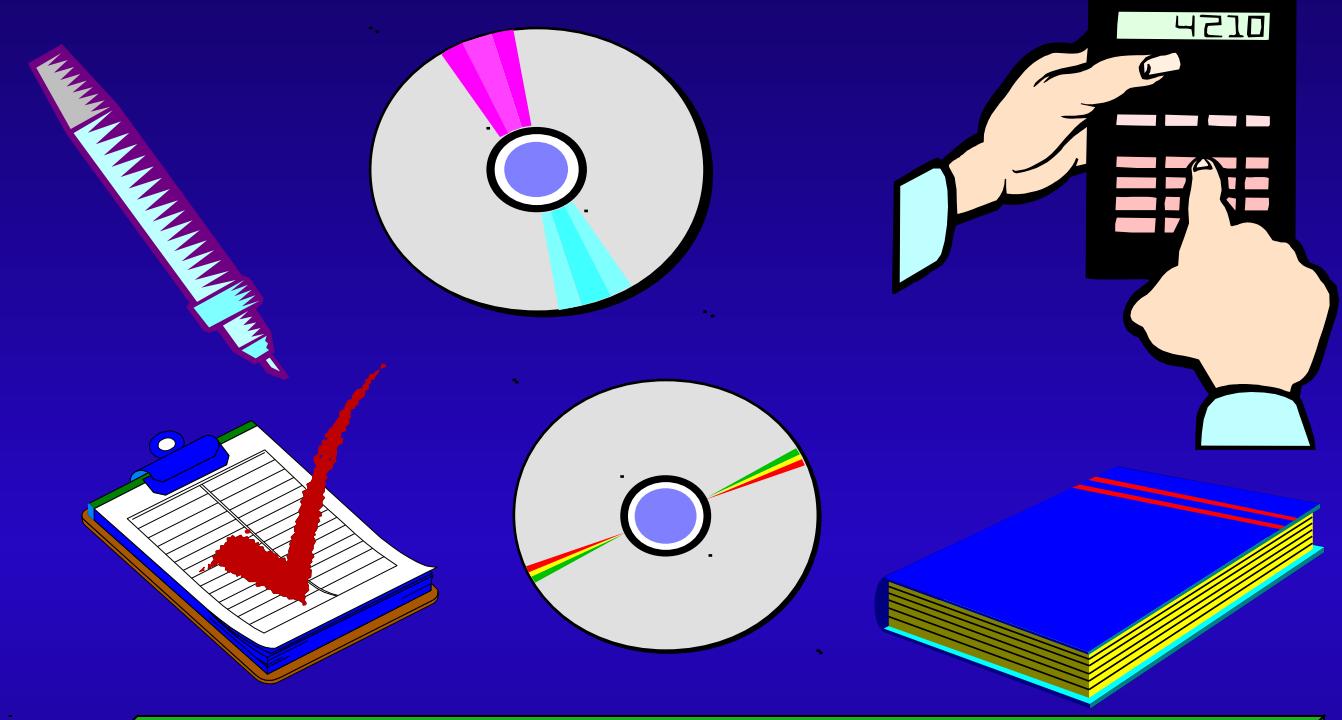
Chalk

Pallet Cards

Pallet Bags

DD 2131 / 2133

TB 55-46-1



# UMO/Unit Preparation Tasks

- Identify the **number of personnel and type and quantity of cargo and equipment** to be moved by air
- Prepare/review air movement plan with higher HQ. Plan should detail unit actions and include sequence of movement for troops & equipment
- Establishing **unit priorities/sequence** for arriving at APOD or area of operations
- Establish **liaison** with supporting agencies
- Identify the cargo or equipment that requires **special handling** based on shipping configuration or fragile/hazardous characteristics
- Request technical assistance to prepare equipment and train personnel available from higher HQ, installation UMC, A/DACG & CRE [Air Force] (if required)

# UMO/Unit Preparation Tasks (cont)

- Plan and coordinate required **administrative support, unit movement training, air movement planning, logistics and maintenance support, and prepare briefs** for deploying personnel on standard safety practices in and around aircraft
- Assign unit movement or **embarkation officer**
- **Plan movement** to POE (convoy, rail, water, commercial truck)
- Establish trained **load teams** to assist the A/DACG
- Identify foreign border clearance requirements (if applicable)
- Enter force deployment requirements into TC-ACCIS/TC-AIMS II (**DEL/UDL**) to accurately reflect lift requirements and deployment priorities
- Determine requirements for vehicle cargo **restraint devices**

# UMO/Unit Preparation Tasks (cont)

- Review inspection procedures and documentation requirements for **hazardous cargo**
- Preparing & organizing soldiers for **air movement** (Includes designating key personnel, determining procedures for transportation of individual weapons and equipment procedures, aircraft safety & manifesting)
- Obtain **BBPCT** and determine aircraft shoring requirements, ensuring its availability before loading and establish destination disposition procedures
- Determining **463L pallets requirements** (including net sets, plastic pallet covers and dunnage)

# UMO/Unit Preparation Tasks (cont)

- Prepare **movement documentation** (vehicle load plans, DEL) - consider secondary cargo and hazardous or sensitive cargo/equipment
- Preparing equipment & cargo to include 463L pallet & vehicle loads (Includes configuring equipment for air movement and weighing vehicles and marking center of balance) IAW DOD 4500.9 (Defense Transportation Regulations)
- Identify **support requirements** (MHE, scales, prime movers etc to the DACG)

# DACG Preparation Tasks

- Determine the number of personnel and type and quantity of cargo to be moved
- Determine the **timeframe** for loading
- Confirm the **location** or airfield(s) and marshaling area(s) with the installation or base commander and the deploying unit
- Determine available APOE logistic and administrative **facilities**
- Determine user support facilities (MHE, security, lighting, fuels, etc)
- Establish **liaison** with the deploying unit and other support activities

# DACG Preparation Tasks

- Coordinate with the CRE to establish DACG training requirements
- Coordinate foreign border clearance requirements and procedures (if necessary)
- Obtain DEL/UDL of unit cargo and equipment to be loaded. Identify any problems that will affect loading or require special attention to the CRE
- Validate shoring requirements
- Ensure 463L pallet dunnage availability

# Preparing Personnel for Air Movement



# Soldier Readiness Program

- **Personal readiness**
  - Legal (will, power of attorney)
  - Financial (pay, credit cards, rent, car payments)
  - Medical / dental
  - ID card and tags / etc.
  - Individual



# Preparing Personnel for Air Movement

- Identify key unit personnel and assign duties & responsibilities
- Key positions include:

## Unit liaison to A/DACG:

- Facilitates communication between unit and A/DACG
- Clarifies processing procedures and resolves problems

## Planeload or troop commander:

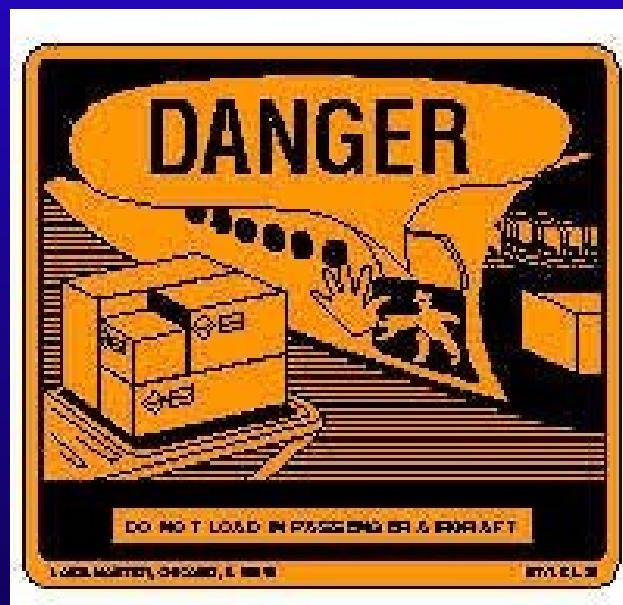
- Assumes control of all passengers listed for movement on the flight
- Ensures passengers are briefed on aircraft procedures
- Ensures necessary support is provided during enroute stops

## Preparing Personnel for Air Movement (cont)

- **Training:**

Unit vehicle drivers & equipment operators may require training in aircraft loading & off-loading and proper procedures for restraining unit cargo (under aircraft load master supervision)

Personnel preparing hazardous cargo for air movement require training & certification



# Preparing Personnel for Air Movement (cont)

- **Individual Weapons:**

Develop and brief individual weapons & ammunition procedures for airlift ops

Reference TM 38-250 for instructions on packing & certification of ammunition

Weapons should be “cleared” before boarding aircraft

Personnel requiring loaded weapons must be identified to aircraft commander



# Preparing Personnel for Air Movement (cont)

- **Brief Personnel:**

Briefing should provide a basic understanding of in-flight responsibilities and procedures for disembarking aircraft.

Briefing should include identification of key personnel (troop commander, load master)



# EQUIPMENT PREPARATION AND JOINT INSPECTION



# Overview of Equipment Preparation

- Responsibilities
- Inspection Procedures
- DD Form 2133



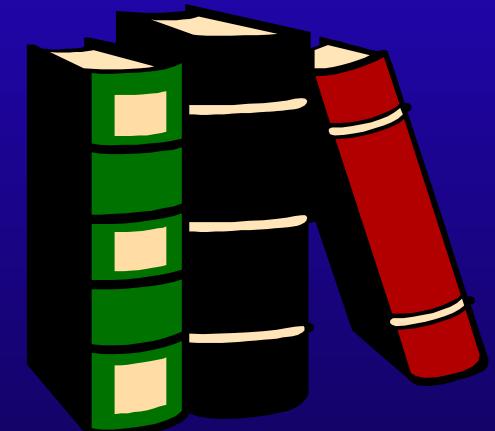
# Preparing Equipment and Cargo for Air Movement

- References for equipment preparation include:

FORSCOM/ARNG 55-1, *Unit Movement Planning*

FM 55-9, *Unit Air Movement Planning*, Appendix B

DD Form 2133, Joint Airlift Inspection Record



# Joint Inspection Process

- Ensures that personnel, vehicles, supplies and equipment are airlifted safely
- **Two steps**
  - Prepare vehicles, supplies and equipment for the Joint Inspection
  - The actual inspection



# Responsibilities

- All equipment must be properly prepared and documented before it can be loaded on any aircraft



# Responsibilities

- **CRE or MST**

- Responsible for approving all aircraft loads
- Supervising the loading/off loading and tie down of vehicles and cargo
- Assuring compliance with applicable aircraft loading manuals

- **Transported Unit**

- Responsible for setting up the movement precedence, cargo preparation and troop management
- Preparing the documentation and on and off loading and restraining all cargo aboard AMC aircraft

# Responsibilities

## ▪ **Joint**

- Accomplish and document final joint inspections
- Qualified representatives from the moving unit, DACG/MCC, and the supporting airlift representative will perform the inspection
- The aircraft loadmaster or boom operator can conduct the final inspection



# Joint Inspection Procedures

- Qualified Air Force and transported unit representatives will conduct final inspections
- The completed form will indicate inspections are complete
- No “Before Loading Inspection” is required by the aircrew; if all noted discrepancies are corrected before loading
- HAZMAT certifier for transported unit must be present during the inspection

# Joint Inspection Form

- **DD Form 2133** is used as the **final joint inspection** document (example form at FM 3-35.4, p.K-3)
- **Three copies** are completed for each aircraft load and signed by representatives of the transported force and the supporting airlift personnel

- 1) Attach the original signed copy to the aircraft cargo manifest
- 2) CRE or MST/DACG/MCC will keep one copy for station
- 3) Transported force will keep one copy

JOINT AIRLIFT INSPECTION RECORD (See Instructions on back.)								PAGE OF PAGES
1. UNIT BEING AIRLIFTED	2. DEPARTURE AIRFIELD		3. DATE (YYYYMMDD)					
4. AIRCRAFT TYPE AND MISSION NUMBER	5. LOAD/CHALK NO.	6. START TIME	7. COMPLETE TIME	8. TALCE/CDF				INCREMENT/SERIAL/BUMPER NUMBER AND TYPE
LEGEND (Mark blocks after each item as follows)								
<input checked="" type="checkbox"/> ✓ SATISFACTORY								
<input type="checkbox"/> UNSATISFACTORY								
IF NOT APPLICABLE, LEAVE BLANK								
A. DOCUMENTATION								
1. MAINTENANCE LOAD PLANS								
2. CARRIER DECLARATION								
3. AIRPORTERS DECLARATION								
4. HAZARDOUS MATERIALS PREPARATION								
5. LOAD LISTS/CARGO TRANSFER FORMS								
B. VEHICLES/NON-POWERED EQUIPMENT								
13. CLEAN								
14. TIRES CLEAR								
15. MECHANICAL CONDITION								
a. ENGINE RUNS								
b. BRAKES OPERATIONAL								
16. BATTERY								
a. SECURE - NO LEAKS								
b. BATTERIES PROTECTED								
17. FUEL TANK(S) LEVELS								
a. AS REQUIRED								
b. FUEL TANK CAPS INSTALLED								
18. JERRY CANS								
a. FULL SL (Metal)								
b. POP (Plastic)								
19. DIMENSIONS (Fit A/C Profile or Contour)								
20. CENTER OF BALANCE (Both Sides)								
21. SCALE WEIGHT (Both Sides)								
22. AXLE WEIGHTS (Both Sides)								
23. TIRE PRESSURE (Serviceable)								
24. CABLE HOOKS/CLEVESES								
a. SERVICEABLE								
b. SAFETY PIN ATTACHED (Safety Chains)								
25. VEHICLE EQUIPMENT SECURE (Tools, tires, etc.)								
26. TIRE PRESSURE (Non-Serviceable)								
27. ACCOMPANYING LOAD								
a. WITHIN VEHICLE RATED CAPACITY								
b. SECURE TO VEHICLE								
28. LOX/NITROGEN CART (Vent Kit)								
C. PALLETS/PALET TRAINS								
29. CARGO								
30. SCALE WEIGHT								
31. SCALE WEIGHT								
32. DIMENSIONS (Fit A/C Profile or Contour)								
33. CARGO PROPERLY SECURED								
a. NETTED								
b. CHAINS/STRAPPED								
34. DUMPAGE (D Pallets Per Pallet)								
D. HELICOPTERS (If any)								
35. FUEL QUANTITY (Gallons)								
36. BATTERY (Disconnected/Taped)								
37. CENTER OF BALANCE (Both Sides)								
38. SCALE WEIGHT (Both Sides)								
39. SHORING (Tie-Downs, Approach)								
40. SPECIAL LOADING EQUIPMENT (Towbars, etc.)								
41. REMARKS								
THE ABOVE LISTED ITEMS HAVE BEEN INSPECTED FOR PROPER SHIPPING CONFIGURATION.								
42. DEPLOYING FORCE REPRESENTATIVE (Signature/Rank/Unit of Assignment)								43. MOBILITY FORCE INSPECTOR (Signature/Rank/Unit of Assignment)

# General Guidelines

- **Vehicles and equipment** should be prepared so as not to diminish their combat capability. They should not be reduced greater than that required to meet the dimensional and weight restrictions of the aircraft transporting them.
- **General cargo** can be carried in or on any vehicle if the cargo can be properly secured and restrained.
- Supplies and equipment not transported as secondary loads should be palletized.
- **Internal airlift/helicopter slingable units** (ISU) are certified for air transportation. The keys to the containers must be available throughout the deployment process. Hazardous materials must be accessible at all times when containerized.
- **463L pallets** are certified for airlift to a maximum of 10,000 pounds weight. There are various height restrictions, according to the pallet's position within the aircraft.

# DD Form 2133 (Joint Airlift Inspection Record)



★ Use as a guide when preparing equipment and cargo for  
Ref: FM 3-35.4, p.K-3

# DD Form 2133 - Heading

- Page \_\_\_ of \_\_\_ Pages
- 1. Unit Being Airlifted (numerical designation and geographic location of the deploying unit)
- 2. Departure Airfield
- 3. Date (YYYYMMDD) of inspection
- 4. Aircraft Type and Mission Number
- 5. Load/ Chalk Number
- 6. Start Time: of inspection (local)
- 7. Complete Time: of inspection (local) - load ready for movement
- 8. CRE / CDF (Cargo Deployment Function) numerical designator

JOINT AIRLIFT INSPECTION RECORD <i>(See Instructions on back.)</i>				PAGE OF PAGES
1. UNIT BEING AIRLIFTED 7th Trans Gp, Ft Eustis, VA		2. DEPARTURE AIRFIELD Langley AFB, VA	3. DATE (YYYYMMDD) 20030115	1005
4. AIRCRAFT TYPE AND MISSION NUMBER C17 015/03		5. LOAD/CHALK NO. 05/07	6. START TIME 1005	7. COMPLETE TIME 1430
				8. TALCE/CDF 15 AMCS

# DD Form 2133 - Legend

✓ = Satisfactory

✗ = Unsatisfactory

If Not Applicable, Leave Blank

JOINT AIRLIFT INSPECTION RECORD <i>(See Instructions on back.)</i>				PAGE <input type="text"/> OF <input type="text"/> PAGES			
1. UNIT BEING AIRLIFTED	2. DEPARTURE AIRFIELD	3. DATE /YYYYMMDD/					
4. AIRCRAFT TYPE AND MISSION NUMBER				5. LOAD/CHALK NO.	6. START TIME	7. COMPLETE TIME	8. TALCE/CDF
LEGEND (Mark blocks after each item as follows):							
✓ = SATISFACTORY ✗ = UNSATISFACTORY If NOT APPLICABLE, LEAVE BLANK							
A. DOCUMENTATION							
1. AIRCRAFT LOAD PLANS							
10. SHIPPERS DECLARATION							
11. HAZARDOUS MATERIALS PREPARATION							
12. LOAD LISTS/CARGO TRANSFER FORMS							
B. VEHICLES/NON POWERED EQUIPMENT							
13. CLEAN							
14. FUEL LEAKS							
15. MECHANICAL CONDITION							
a. ENGINE RUNS							
b. BRAKES OPERATIONAL							
16. BATTERY							
a. SECURE - NO LEAKS							
b. ELECTRIC CABLES PROTECTED							
17. FUEL TANKS/LEVELS							
a. AS REQUIRED							
b. FUEL TANK CAPS INSTALLED							
18. JERRY CANS							
19. EQUIPMENT (Metal)							
b. POP (Plastic)							
20. DIMENSIONS (Fit A/C Profile or Contour)							
21. CENTER OF BALANCE (Both Sides)							
22. SCALE WEIGHT (Both Sides)							
23. AXLE WEIGHTS (Both Sides)							
24. TIRE WEIGHTS (Serviceable)							
25. PINTLE HOOKS/CLEVESED							
a. SERVICEABLE							
b. SAFETY PIN ATTACHED (Safety Chains)							
26. VEHICLE EQUIPMENT SECURE (Tools, tires, etc.)							
27. TIE DOWN (Rolling, Packing, Sleeper, Approach)							
28. ACCOMPANYING LOAD							
a. WITHIN VEHICLE RATED CAPACITY							
b. SECURE TO VEHICLE							
29. LOX/NITROGEN CART (Vent Kit)							
C. PALLETS/PALETTES							
30. CLEAN							
31. SCALE WEIGHT							
32. DIMENSIONS (Fit A/C Profile or Contour)							
33. CARGO PROPERLY SECURED							
a. NETTED							
b. TIED DOWN/STRAPPED							
34. DUNNAGE (2 Pieces Per Pallet)							
D. HELICOPTERS (Pheway)							
35. FUEL QUANTITY (Gallons)							
36. BATTERY (Disconnected/Taped)							
37. CENTER OF BALANCE (Both Sides)							
38. SCALE WEIGHT (Both Sides)							
39. SHORING (Rolling, Packing, Approach)							
40. SPECIAL LOADING EQUIPMENT (Towbars, etc.)							
41. REMARKS							
THE ABOVE LISTED ITEMS HAVE BEEN INSPECTED FOR PROPER SHIPPING CONFIGURATION.							
42. DEPLOYING FORCE REPRESENTATIVE (Signature/Rank/Unit of Assignment)				43. MOBILITY FORCE INSPECTOR (Signature/Rank/Unit of Assignment)			
DD FORM 2133, OCT 1998 (EG)							
PREVIOUS EDITION IS OBSOLETE.							

# DD Form 2133 -

## Increment/Serial/Bumper Type

- Each item has its own column
- TCN's (Transportation Control Numbers) will be used to identify each individual item

LEGEND (Mark blocks after each item as follows)		INCREMENT/SERIAL/BUMPER NUMBER AND TYPE											
<input checked="" type="checkbox"/>	= SATISFACTORY												
<input type="checkbox"/>	= UNSATISFACTORY												
IF NOT APPLICABLE, LEAVE BLANK													

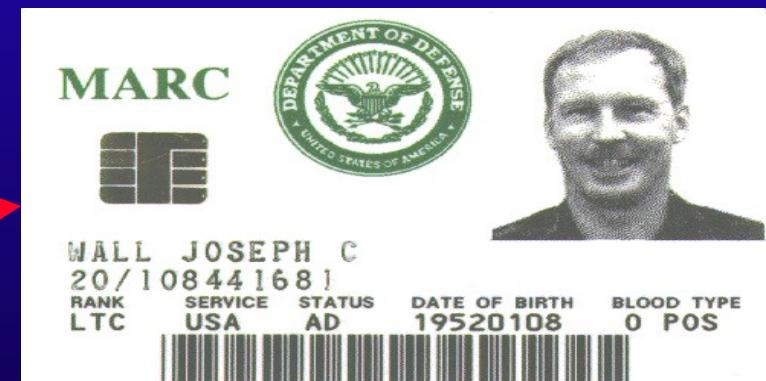
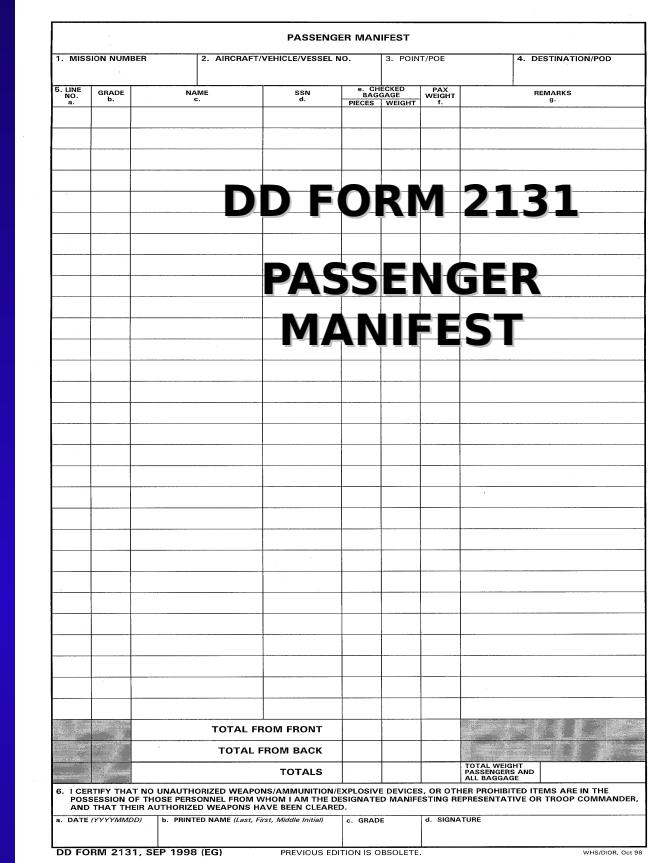
## DD Form 2133 - Section A: Documentation

## **Item 9.**

# Manifests (DD FORM 2131)

# Loadplans (DD FORM 2130 series)

- 7 for CONUS / 15 for OCONUS moves
- Check for proper manifesting of the entire chalk, and check that the load plane scale weights match the manifest weights
- Zero defects – 100% accountability
- Ensure the load is correctly sequenced (IAW manifest) and compiles with all aircraft loading and safety of flights limitations
- ID card for accountability



# DD Form 2133 - Section A: Documentation (Cont)

## Item 10. Shipper's Declaration for Dangerous Goods

Check for proper preparation of all required hazardous material documentation and certification

SHIPPER'S DECLARATION FOR DANGEROUS GOODS							
Shipper <i>ABC Company 1000 High Street Youngville, Ontario Canada</i>	Air Waybill No. <i>800 1234 5678</i>						
Consignee <i>CBA Inc. 50 Rue de la Paix Paris 75 006 France</i>	Page <i>1</i> of <i>1</i> Pages Shipper's Reference Number (optional)						
<i>For optional use for Company logo name and address</i>							
<i>Two completed and signed copies of this Declaration must be handed to the operator.</i>							
<b>TRANSPORT DETAILS</b>							
This shipment is within the limitations prescribed for: <i>(check if not applicable)</i>	Airport of Departure <i>Youngville</i>						
<input checked="" type="checkbox"/> PASSENGER AND CARGO AIRCRAFT ONLY	<input type="checkbox"/> CARGO AIRCRAFT ONLY						
Airport of Destination <i>Paris, Charles de Gaulle</i>							
Shipment type: <i>(check if not applicable)</i> <b>NON-RADIOACTIVE - RADIOACTIVE</b>							
<b>NATURE AND QUANTITY OF DANGEROUS GOODS</b>							
Dangerous Goods Identification							
Proper Shipping Name	Class or Division	UN or ID No.	Pack Group	Subs- dairy Risk	Quantity and type of packing	Hacking Inst.	Authorization
Nicotin	6.1	UN1654	II		1 Steel drum 20 L	671	
Self-reactive solid type D (Benzene Sulfophenyl-oxide)	4.1	UN3226	II		1 Fibreboard box a 10 kg	430	
Paste	3	UN1263	II		2 Fibreboard boxes a 4 L	305	
Paste	3	UN1263	III		1 Fibreboard box 30 L	309	
Vehicle (flammable liquid powered)	9	UN3166			One automobile 1350 kg	900	
Chemical lice	9	UN3316	II		1 Fibreboard box a 3 kg	915	
Additional Handling Information <i>The packages containing UN3226 must be shaded from direct sunlight, stored away from all sources of heat in a well ventilated area and not intermixed with other cargo.</i>							
I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labelled/placed, and are in all respects in proper condition for transport according to applicable International and national governmental regulations.						Name/Title of Signatory <i>B. Smith, Dispatch Supervisor</i> Place and Date <i>Youngville 1 January 1999</i> Signature <i>(see writing above)</i> <b>B. Smith</b>	

## DD Form 2133 - Section A: Documentation (Cont)

- **Item 11.** Hazardous Materials Preparation - check that all hazardous cargo in vehicles or as secondary loads is properly prepared, position and compatible with other hazardous material in the chalk as determined in TM 38-250
- **Item 12.** Load Lists / Cargo Transfer Forms: a list of items shipped must be included - ensure proper preparation of all required load lists and/or custodial transfer documentation

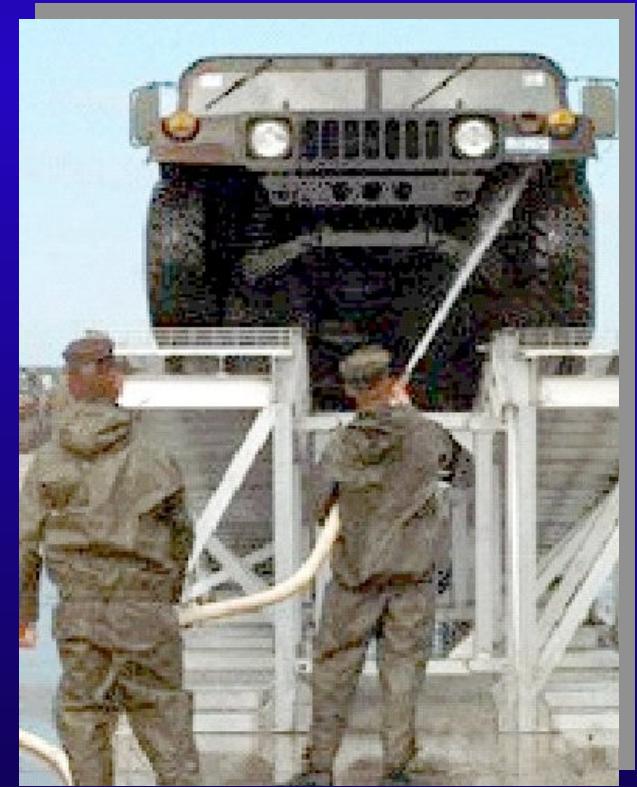
DD Form 2133 - Section A: Documentation (Cont)

- Maintain a Vehicle Load Card (FORSCOM Form 285-R or DA Form 5748-R) for each cargo-carrying vehicle

# DD Form 2133 - Section B: Vehicles / Non-Powered Equipment

## ■ **Item 13:** Clean

- No dirt, trash or pests
- Clean each item of grime, oil, dirt etc
- Stream clean if necessary
- Clean all vehicle tires of rocks/pebbles embedded in the treads



# DD Form 2133 - Section B: Vehicles / Non-Powered Equipment (cont)

## ■ Item 14: Fluid Leaks

- Five drops or more per minute from a cooling system, crank case, or gear case is a leak - NO GO
- Fuel or brake system leaks, no matter how minor, will prevent air shipment - NO GO
- Do not consider a damp or discolored seal a leak unless any of the above conditions exist



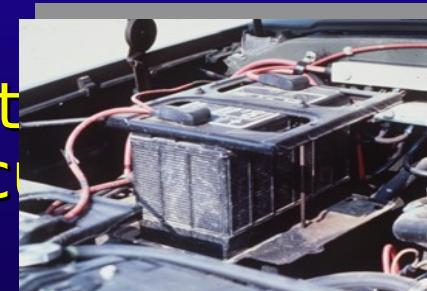
## DD Form 2133 - Section B: Vehicles / Non-Powered Equipment (cont)

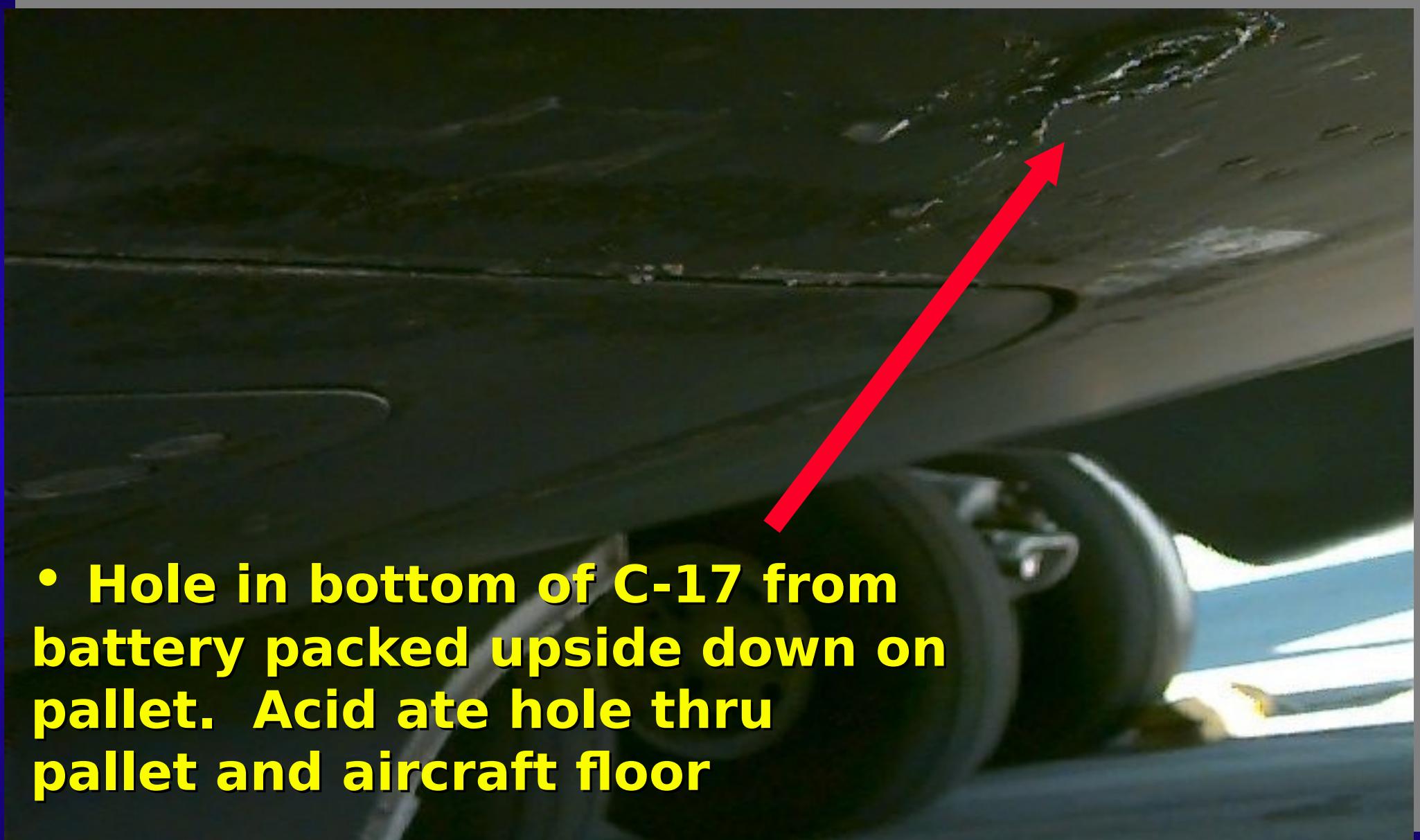
### ■ **Item 15:** Mechanical Condition

- **15A** - Engine Runs: Unless a vehicle is shipped as retrograde cargo it must be operational
- 15B - Brakes Operational: Check that engine brakes and emergency brakes operate

### ■ **Item 16:** Battery

- **16A** - Secure no leaks: Ensure battery is correctly installed. Ensure holding clamp is secure, filler caps tightly installed. Battery connectors are tight and all cables/clamps are not in contact with any grounding point during loading or flight
- **16B** - Post/Cables-Protected: To secure the battery from short circuit, completely protect the terminal posts from contact (disconnect if necessary)
- If disconnected ensure terminals are covered with covers or tape to prevent damage and short circuit





- **Hole in bottom of C-17 from battery packed upside down on pallet. Acid ate hole thru pallet and aircraft floor**

# DD Form 2133 - Section B: Vehicles / Non-Powered Equipment (cont)

## ■ **Item 17: Fuel Tank (s) Levels**

- Vehicles and self-propelled units will not exceed  $\frac{3}{4}$  of a tank when positioned on the cargo floor or  $\frac{1}{2}$  a tank when positioned on the cargo ramp of the C-130, C-17, and C-5
- Vehicles and self-propelled units may be filled with fuel not to exceed  $\frac{1}{2}$  full when loaded on the KC-10 and the KC-135
- Equipment that is ramp loaded will be positioned with the gas tank opening on the high side of the ramp
- Wheeled engine-powered support equipment (such as wheeled generators) will not exceed  $\frac{1}{2}$  tank regardless of aircraft or position on the aircraft
- Palletized vehicles or self-propelled equipment will not exceed  $\frac{1}{2}$  of a tank. Palletized generators will be drained



## Fuel Tank Levels (cont)



C-17



C-130



C-5

Vehicles and self propelled units: 3/4 full on cargo floor 1/2 full on



ramp

KC-10

KC-135

Vehicles and self propelled units: 1/2 full anywhere on aircraft

## Fuel Levels (cont)

- Single axle units disconnected from its prime mover and loaded with its tongue resting on the aircraft floor or ramp must be drained, but need not be purged (up to 500 ml [17 ounces] of fuel may be left in engine components and fuel lines)



## DD Form 2133 - Section B: Vehicles / Non-Powered Equipment (cont)

- **Item 17b** - Fuel Tank(s) Caps Installed



Ref: FM 3-35.4, p.K-4

# DD Form 2133 - Section B: Vehicles / Non-Powered Equipment (cont)

## ■ **Item 18: Jerrycans**

### ■ **18A: DOT 5L (Metal)**

- Authorized for transporting flammable liquid fuel stocks
- Combined with fuel shipped in vehicle tanks do not exceed two full tanks supply
- Must be secured in approved storage racks designed to prevent movement or leakage during airlift
- Must be serviceable - ie serviceable gasket in place on the screw gap closure, no leakage or dents in seams
- Can only be palletized when drained (purging not required)
- No minimum fuel requirement - 5 gallons maximum (measured to the weld bead near the top of the can)



# DD Form 2133 - Section B: Vehicles / Non-Powered Equipment (cont)

## ■ Item 18: Jerrycans

- **18B: POP (Performance Oriented Packaging) - plastic**
  - Same as for DOT 5L (Metal) except these containers may be palletized with hazardous material inside and a 2% ullage must be maintained to prevent expansion and leakage when filling this container

POP  
Plastic



DOT 5L  
Metal

## DD Form 2133 - Section B: Vehicles / Non-Powered Equipment - Tankers

- No tanker type vehicle is certified to be air-lifted full, with the exception of the M-149A2 water buffalo (only when potable water not readily available at destination)
- Diesel tankers will be drained
- Mogas tankers will be drained and purged

Ref: FM 3-35.4, p.K-1



# DD Form 2133 - Section B: Vehicles / Non-Powered Equipment (cont)

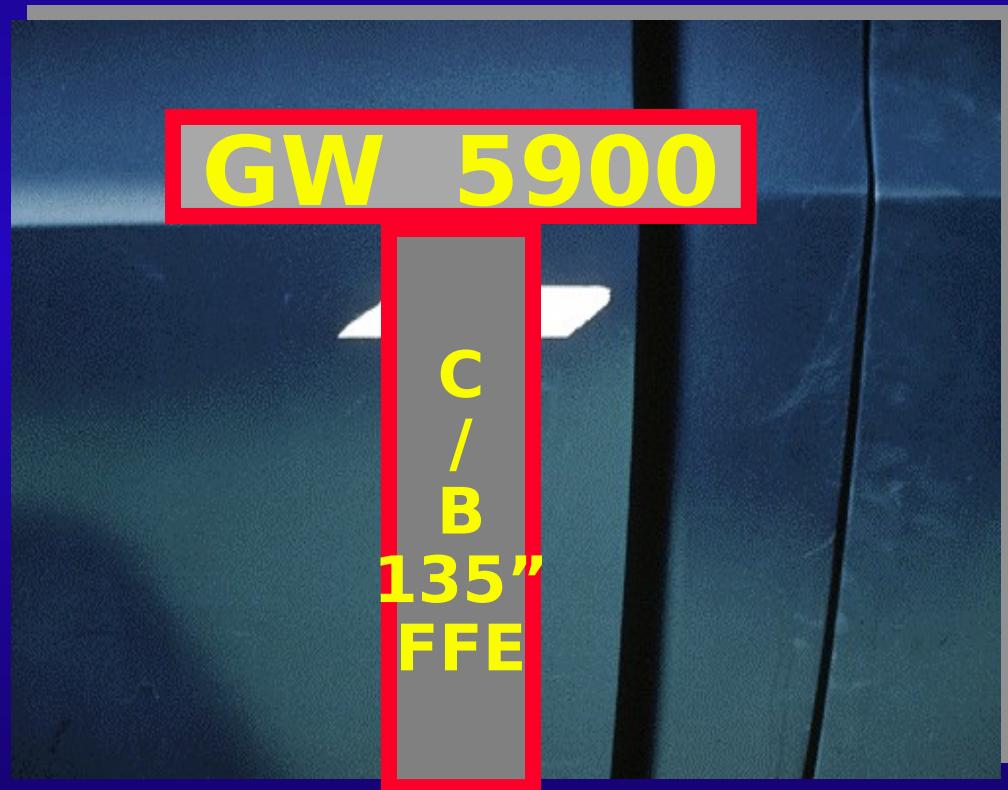
- **Item 19** - Dimensions

- Ensure equipment will negotiate the aircraft ramps and interior dimensions (will not come into contact with the aircraft sidewalls or ceiling at any time)



## DD Form 2133 - Section B: Vehicles / Non-Powered Equipment (cont)

- **Item 20** - Center of Balance - to nearest whole inch (Marked on both sides of vehicle)
- **Item 21** - Scale/Gross Weight - to nearest whole pound (Marked on both sides of vehicle)



## DD Form 2133 - Section B: Vehicles / Non-Powered Equipment (cont)

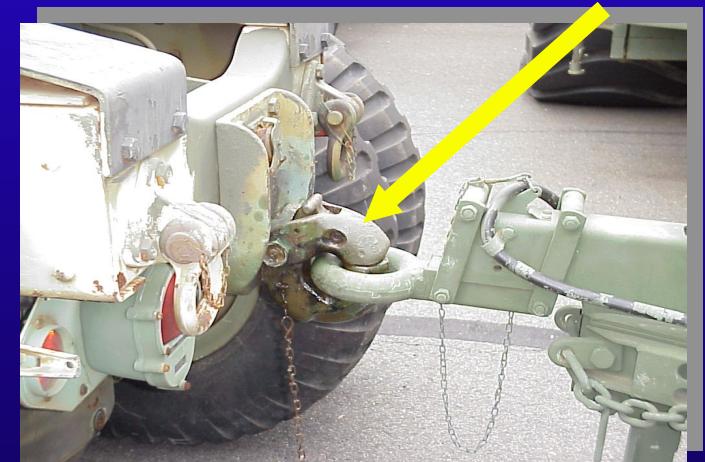
- **Item 22** - Axle Weights  
(Marked on both sides of vehicle)
  - Mark axle weights above each axle



## DD Form 2133 - Section B: Vehicles / Non-Powered Equipment (cont)

### ■ Item 23 – Tiedown Points (Serviceable)

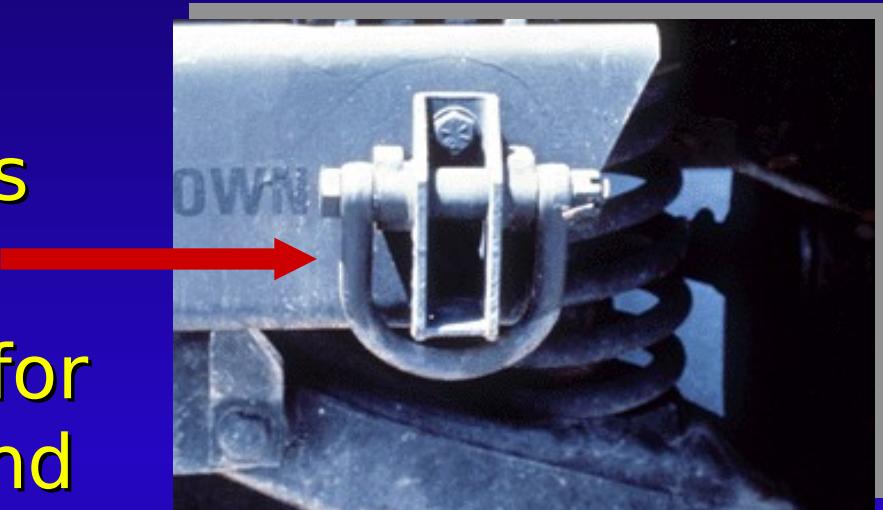
- Ensure all clevises and tie down points are serviceable
- Include interior and exterior cargo restraint tiedowns in the inspection



## DD Form 2133 - Section B: Vehicles / Non-Powered Equipment (cont)

- **Item 24** - Pintle Hooks/Clevises

- **Item 24a** – Serviceable (ensure all devices required for loading/off-loading trailers and cargo are serviceable)



- **Item 24b** - Safety Pin Attached (Ensure all required pins or cotter keys are properly attached and serviceable)



## DD Form 2133 - Section B: Vehicles / Non-Powered Equipment (cont)

- **Item 25** - Vehicle

Equipment Secured: Ensure all vehicle accessories are secure, including fire extinguishers, seat brackets, and any other loose equipment that may become a projectile during flight



## DD Form 2133 - Section B: Vehicles / Non-Powered Equipment (cont)

- **Item 26** - Tire Pressure - ensure within manufacturer specifications (Max 100 psi). Tires must be sufficiently inflated to prevent wheel-rim contact with the aircraft floor. Note that tires are not to be deflated to aid in clearance for loading on board aircraft



## DD Form 2133 - Section B: Vehicles / Non-Powered Equipment (cont)

- **Item 27** - Shoring (Rolling, Parking, Sleeper, Special, Approach)
  - Check that all required shoring is serviceable and immediately available for use
  - Ensure shoring is adequate for the intended task (consult aircraft loading manual)



Ref: FM 3-35.4, p.K-5

## DD Form 2133 - Section B: Vehicles / Non-Powered Equipment (cont)

- **Item 28** - Accompanying Load
  - **Item 28a** - Within Vehicle
  - Rated Capacity ( do not exceed cross-country capacity) - see vehicle data plate



Ref: FM 3-35.4, p.K-5

## DD Form 2133 - Section B: Vehicles / Non-Powered Equipment (cont)

- **Item 28b** - Secure To Vehicle
- Ensure cargo is properly restrained and within the loading criteria for the vehicle (generally not to exceed sidewall height)
- Use a minimum of 1/2 inch diameter rope (not nylon - it stretches) for cargo restraint. 463L aircraft tiedown equipment may also be used
- Ensure rope touches cargo not just side racks
- Consider all locally manufactured modifications as secondary loads

Ref: FM 3-35.4, p.K-5



## DD Form 2133 - Section B: Vehicles / Non-Powered Equipment (cont)

- **Item 29** - LOX/Nitrogen Cart
  - Ensure appropriate vent kit materials are with the cart
  - Ensure a technician is available at loading to install vent



## DD Form 2133 - Section C: Pallets/Pallets Trains

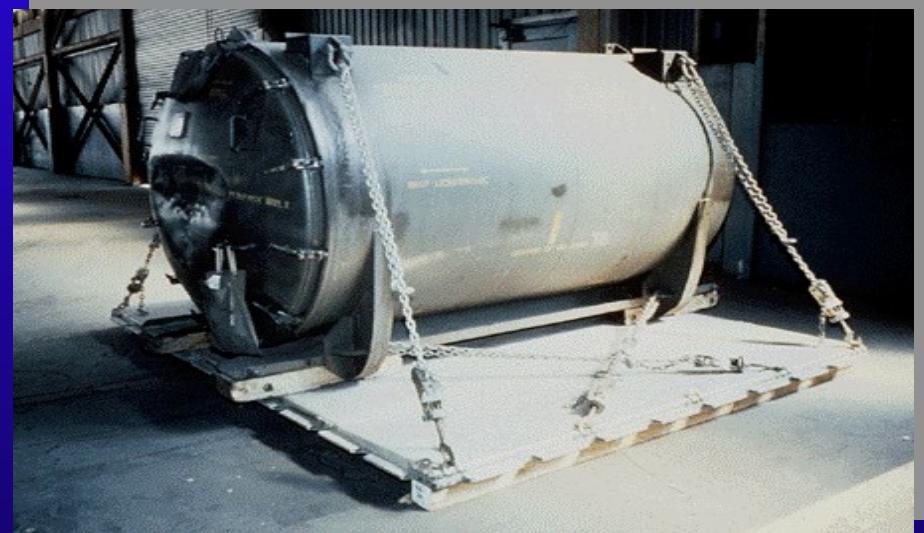


## DD Form 2133 - Section C: Pallets/Pallets Trains

- **Item 30** - Clean: clean each pallet and piece of equipment of all grime, oil, dirt etc - steam clean if necessary. Ensure no soil is transported on or under items loaded on the pallet
- **Item 31** - Pallet Scale Weight (to the nearest pound): attached to one 88-inch side and one 108-inch side of the pallet
- **Item 32** - Dimensions: Check that each pallet does not exceed the dimensions of the planned aircraft position (vary among aircraft and among pallet positions on a specified aircraft) - eg Pallet Position 6 on a C-130 may not exceed 76 inches in height

## DD Form 2133 - Section C: Pallets/Pallets Trains (cont)

- **Item 33** - Cargo Properly Secured
  - **Item 33a** - Netted (nets serviceable and properly installed)
  - **Item 33b** - Chained/Strapped (serviceable and properly installed and provide adequate restraint)



## DD Form 2133 - Section C: Pallets/Pallets Trains (cont)

- **Item 34** - Dunnage (*3 Pieces Per Pallet*)

- Ensure three x 4"x 4" x 88" pieces accompany each pallet during shipment



## DD Form 2133 - Section D: Helicopters (Flyaway)



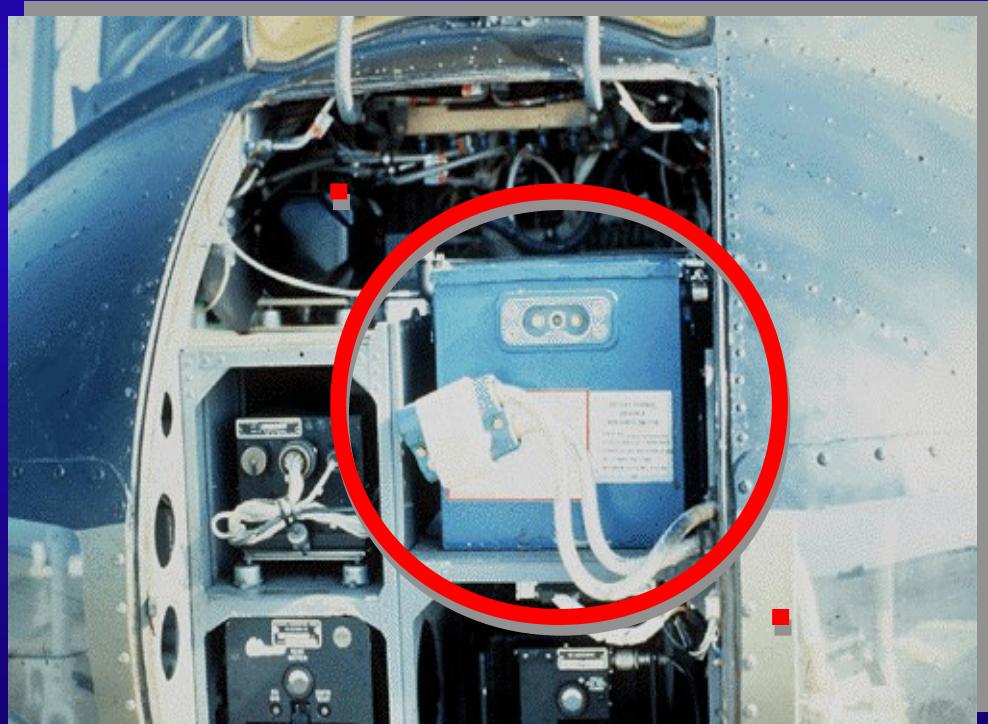
## DD Form 2133 - Section D: Helicopters (Flyaway) (cont)

- **Item 35** - Fuel Quantity (*Gallons*)
  - Do not exceed  $\frac{3}{4}$  full or 150 gallons per tank whichever is less



## DD Form 2133 - Section D: Helicopters (Flyaway) (cont)

- **Item 36** – Battery: Ensure user disconnects and tapes battery terminal and secures the battery to prevent accidental leaks and short circuits



## DD Form 2133 - Section D: Helicopters (Flyaway) (cont)

- **Item 37** - CB

- Ensure user clearly marks the CB on both sides of the item

- **Item 38** - Scale/Gross Weight (Clearly marked on both sides)



# DD Form 2133 - Section D: Helicopters (Flyaway) (cont)

## **▪ Item 39 - Shoring (Rolling, Parking, Approach)**

- Check that all required shoring is serviceable and immediately available for use
- Ensure adequate shoring is available to decrease the ramp angle to keep the helicopter from striking the ground or the aircraft



Ref: FM 3-35.4, p.K-6

## DD Form 2133 - Section D: Helicopters (Flyaway) (cont)

- **Item 40** - Special Loading Equipment
  - Be sure special equipment necessary to load this cargo is available (tools, jacks, pintle hooks, ramps, towbars etc)
- **Item 41** - Remarks
  - List and explain, in detail, any discrepancies found during the inspection and actions taken to correct the problem

## DD Form 2133 - Section D: Helicopters (Flyaway) (cont)

- **Item 42** - Deploying Force Representative
  - Signed by the deploying unit representative accompanying the mobility force inspector
- **Item 43** - Mobility Force Representative
  - Signed by the CRE representative conducting the inspection

THE ABOVE LISTED ITEMS HAVE BEEN INSPECTED FOR PROPER SHIPPING CONFIGURATION.

42. DEPLOYING FORCE REPRESENTATIVE (Signature/Rank/Unit of Assignment)

43. MOBILITY FORCE INSPECTOR (Signature/Rank/Unit of Assignment)

DD FORM 2133, OCT 1998 (EG)

PREVIOUS EDITION IS OBSOLETE.

Reset



# On Learning

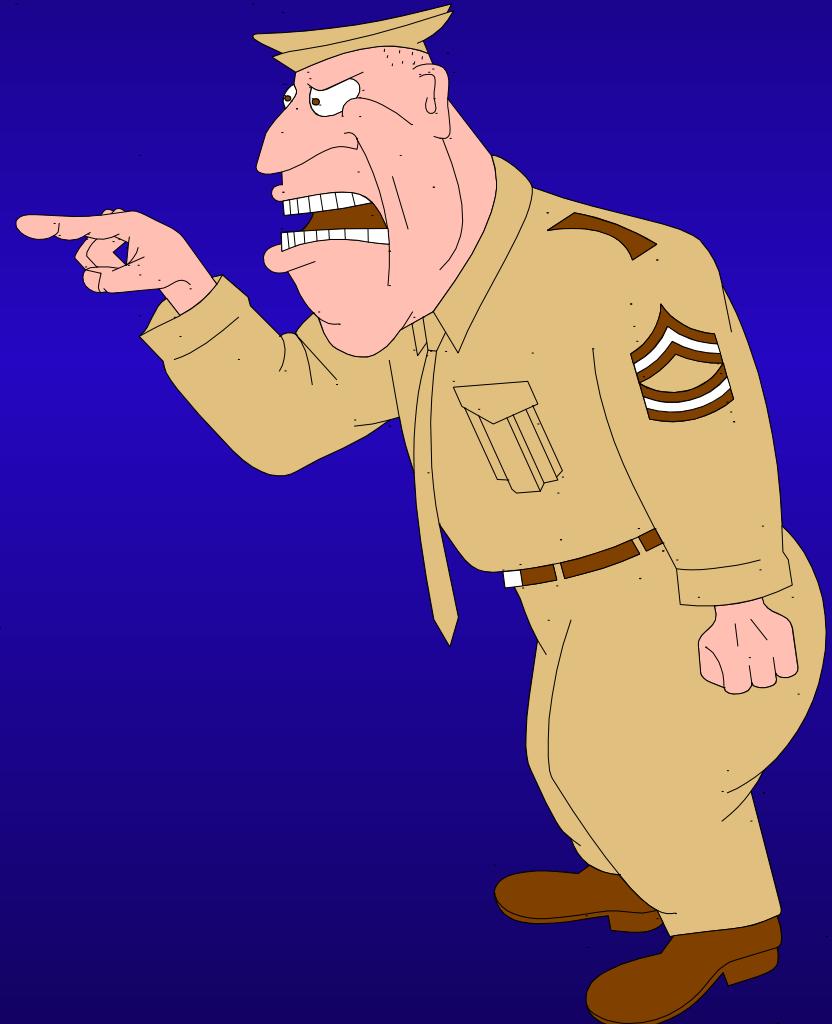
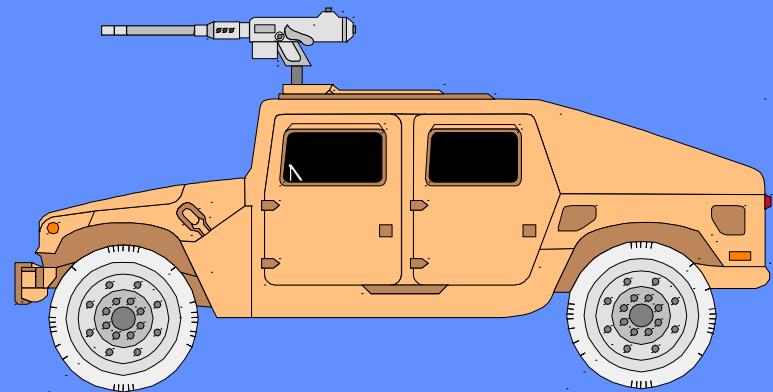
# DETERMINE CENTER OF BALANCE

$D_1 = 20$

$D_2 = 150$

$W_1 = 2,870$

$W_2 = 2,550$



# CARGO WEIGHING

- All cargo offered for shipment must be weighed
  - Portable or fixed scales
  - Indicate actual weight on both sides of items offered for shipment
  - Scale weight must be recorded on all copies of the manifest
- Accuracy of weights
  - Don't weigh cargo until secondary load is secured
  - Don't add or remove cargo
  - Any additions/deletions require cargo to be weighed again

# **TYPES OF SCALES**

## ▪ Fixed Scales

- Permanently installed weighing devices
- These scales are capable of weighing most items of cargo
- Located at most major military installations



## ▪ Portable scales

- Most commonly used have a capacity of 20,000 lbs per scale
- Normally used in multiples of four (minimum is two)
- Used extensively at airfields, marshaling areas and inspection areas



# USING PORTABLE SCALES - VEHICLES

- When only two portable scales are available:
  - Place the scales in front of the tires of the first axle
  - Drive the vehicle onto the scales; keep tires centered on the scales
  - Determine the axle weight - note each scale weight (right and left side) must be combined to obtain the axle weight
  - Continue process until all axles are weighed
- The driver and/or passengers must be out of the vehicle prior to weighing



# USING PORTABLE SCALES - PALLETS

- Weighing pallets
  - Each 463L pallet must be weighed
  - Scale weights must be recorded on all copies of the manifest
  - Place a loaded pallet evenly on two portable scales (three pieces of dunnage must be weighed with the pallet)
  - Add the two scale weights together to get the pallet gross weight
  - Ensure the scale weight is clearly marked on one 88-inch side and one 108-inch side of the pallet



# Wheeled Vehicle Measurement



# Center of Balance Terminology

- **CB** - CENTER OF BALANCE - the point of balance of a piece of cargo
- **FAW** = FRONT/FORWARD AXLE WEIGHT (pounds)
- **IAW** = INTERMEDIATE AXLE WEIGHT (pounds)
- **RAW** = REAR AXLE WEIGHT (pounds)
- **GW** = GROSS WEIGHT (pounds) (the total weight of an item of cargo, including all secondary loads - found by adding all individual axle weights together)
- **RDL** = REFERENCE DATUM LINE (point from which all measurements are taken - normally the forward edge of a vehicle).
- **MOMENT** Product (inch-pounds) obtained by multiplying the weight (axle) by a distance<sub>8</sub>(inches) from the RDL.

# Center of Balance Terminology (cont)

- **FOH** = FRONT OVERHANG (Distance in inches from front edge [bumper] to center of front axle)
- **WB** = WHEEL BASE (Distance in inches from center of front axle to center of rear axle or center of tandem axles)
- **FFE** = FROM FORWARD EDGE (Distance in inches from the most forward edge of a vehicle to its CB)

# Center of Balance Criteria

- Center of balance markings are not required on individual 463L pallets (if built correctly CB will be at or near the center - however, CB marking required for married pallets [pallet train])
- Mark the CB on all items of cargo that meet the following criteria
  - All vehicles
  - Any items of cargo 10 feet or longer
  - Any item with a CB point other than its center

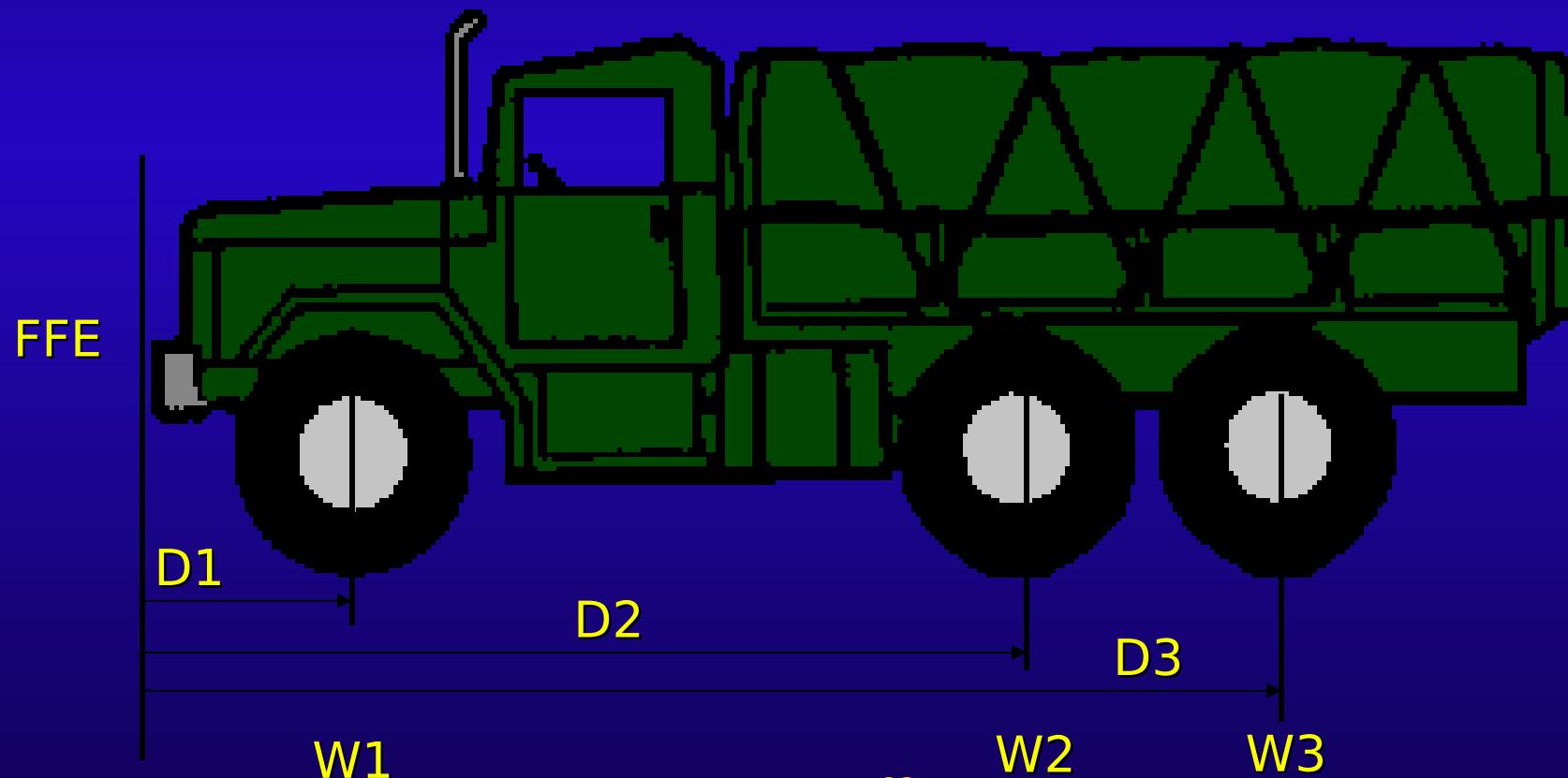


# **CENTER OF BALANCE OF WHEELED VEHICLES**

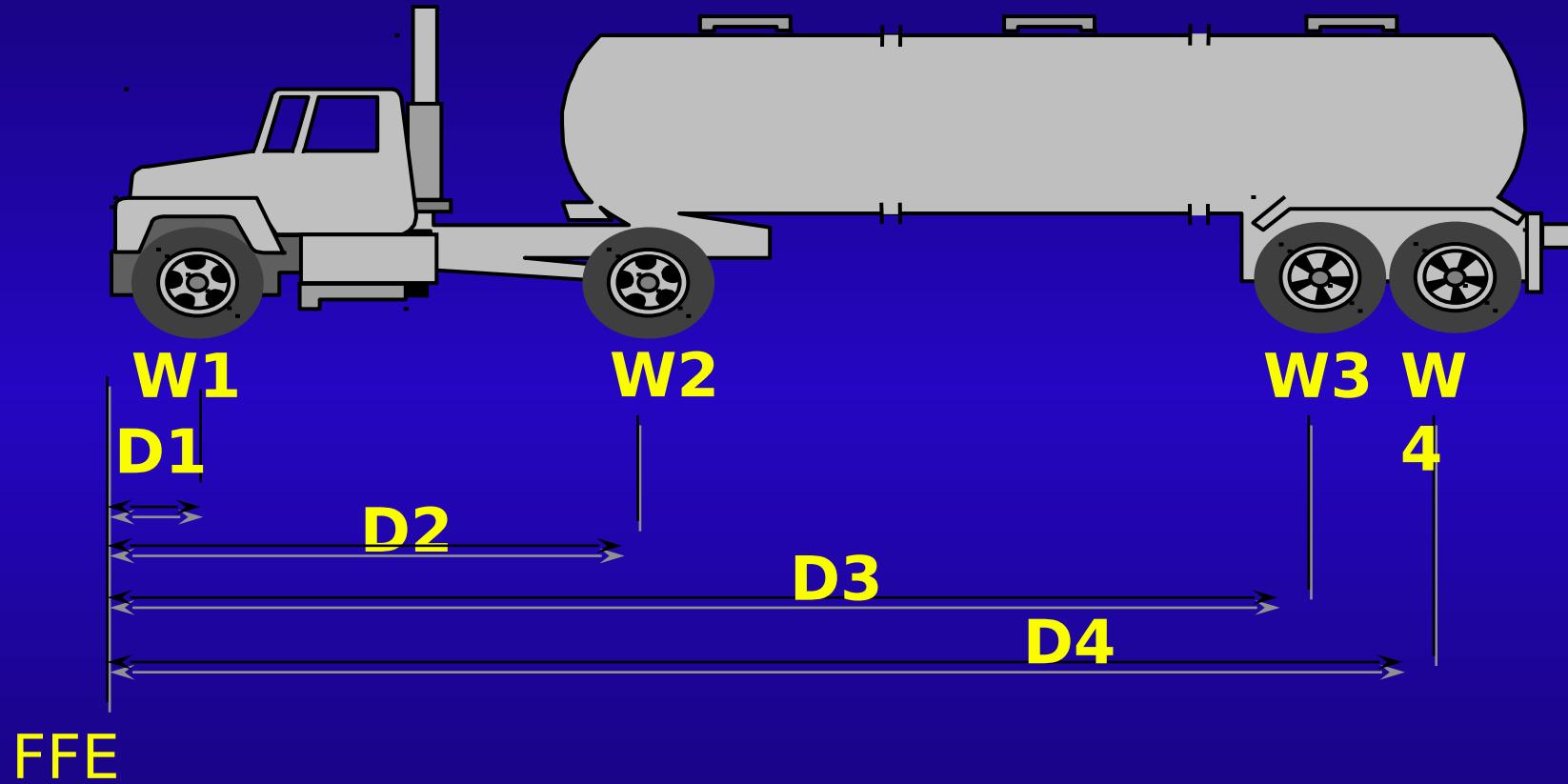


# Wheeled Vehicles CB

- Determine distance from front forward edge (FFE) to the middle of the front, intermediate & rear axles



# Wheeled Vehicles CB (cont)



# Wheeled Vehicles CB (cont)

- Only vehicles that require a combined CB are those tractor-trailers that will remain coupled during flight



# Wheeled Vehicles CB (cont)

W1= Front axle weight in pounds

W2 = Intermediate axle weight

W3= Rear axle weight

D1= Distance in inches, from FFE to Front axle

D2= Distance from FFE to Intermediate axle

D3= Distance from FFE to Rear axle

Gross Weight = Sum of W1, W2, W3 etc (sum of all axle weights)

$$\mathbf{CB} = \frac{(W1 \times D1) + (W2 \times D2) + (W3 \times D3)}{\text{GROSS WEIGHT}}$$

**(rounded to the nearest inch)**

# Wheeled Vehicles CB (cont)

$W_1 = 5,000$  lbs

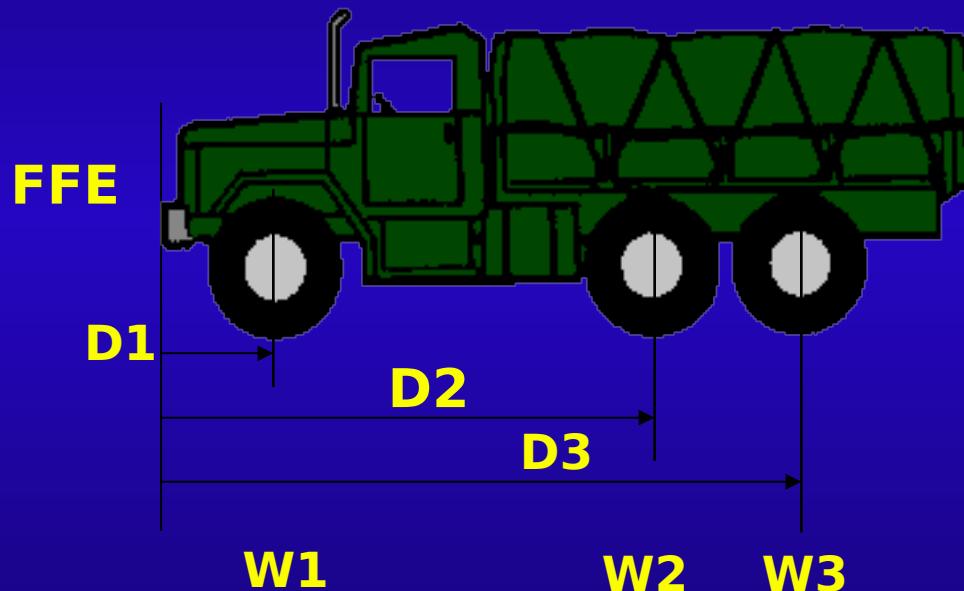
$W_2 = 5,000$  lbs

$W_3 = 5,000$  lbs

$D_1 = 35$  inches

$D_2 = 131$  inches

$D_3 = 177$  inches



# Wheeled Vehicles CB (cont)

$$CB = \frac{(W1 \times D1) + (W2 \times D2) + (W3 \times D3)}{GW}$$

$$CB = \frac{(5,000 \times 35) + (5,000 \times 131) + (5,000 \times 177)}{15,000}$$

$$CB = \frac{175,000 + 655,000 + 885,000}{15,000} =$$
$$1,715,000$$

$$CB = 114.33 \text{ or } 114 \text{ inches (rounded to nearest inch)}$$

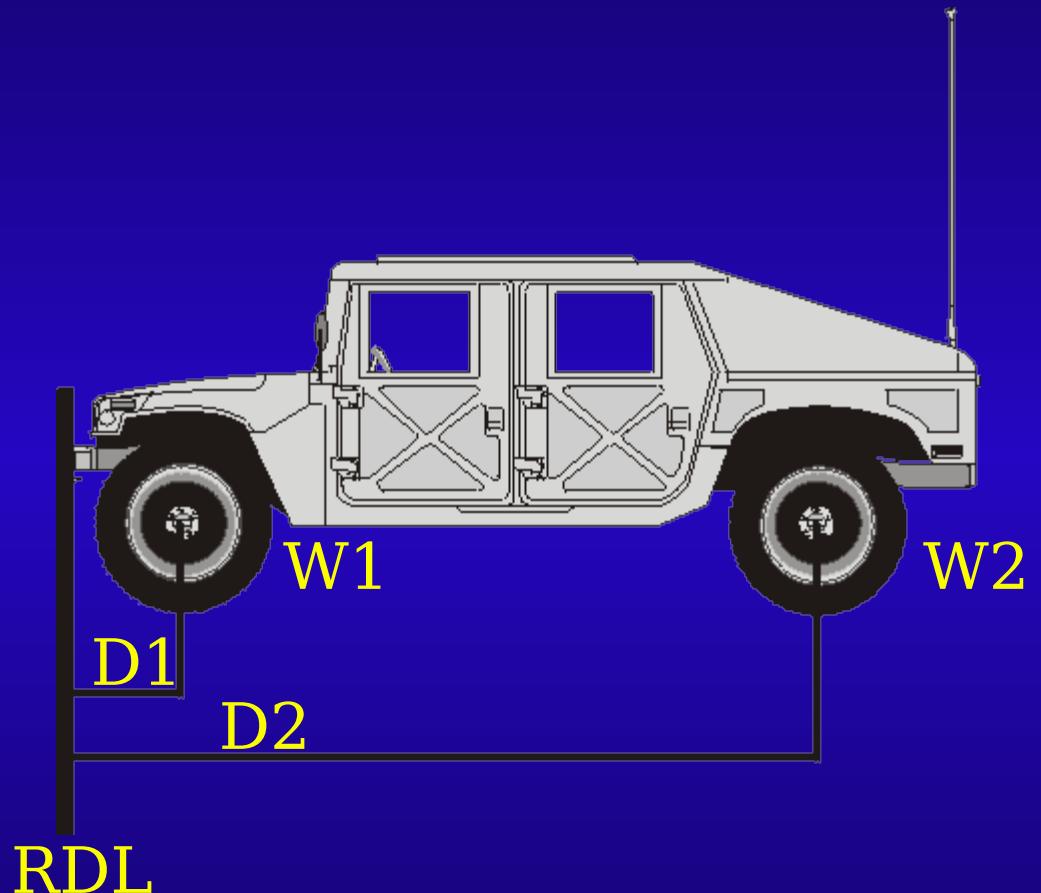
# Sample Problem 1

$$D_1 = 20$$

$$D_2 = 150$$

$$W_1 = 2,870$$

$$W_2 = 2,550$$

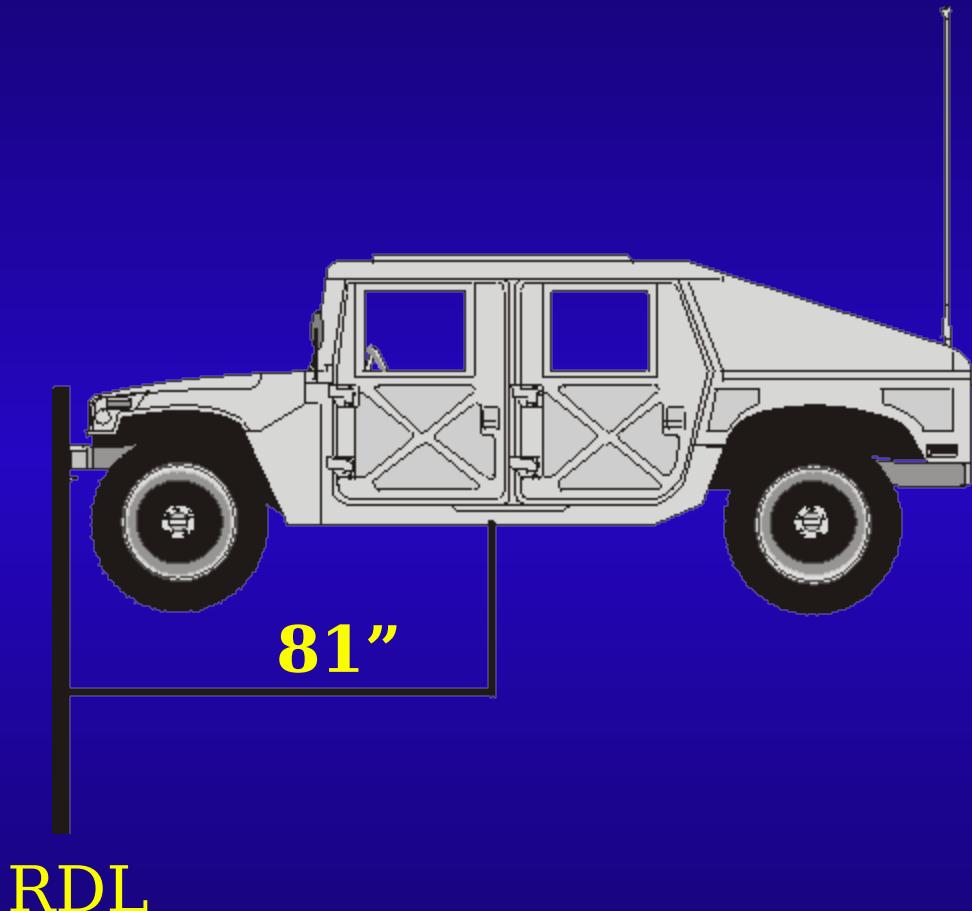


# Sample Problem 1 Solution

$$20 \times 2,870 = 57,400$$

$$150 \times 2,550 = 382,500$$

$$\frac{439,900}{5,420} = 81 \text{ C/B FFE}$$



RDL

# Sample Problem 2

$$D_1 = 70$$

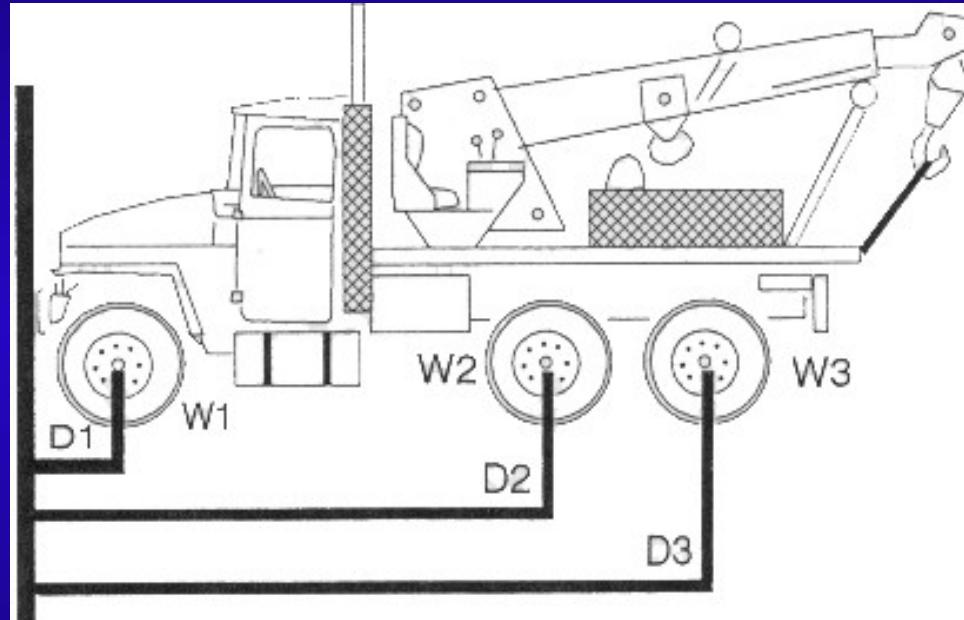
$$D_2 = 222$$

$$D_3 = 276$$

$$W_1 = 12,500$$

$$W_2 = 12,900$$

$$W_3 = 12,700$$



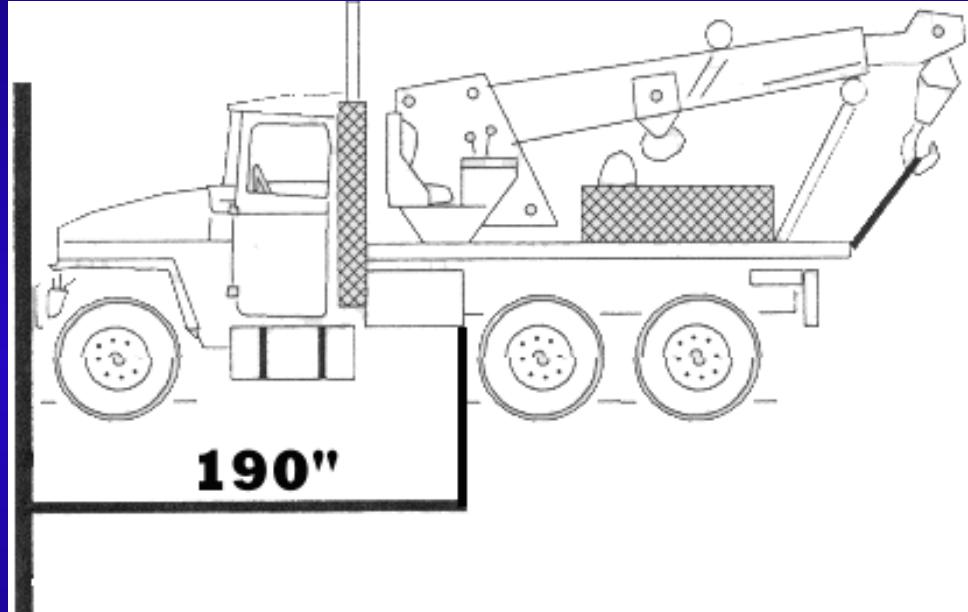
# Sample Problem 2 Solution

$$70 \times 12,500 = 875,000$$

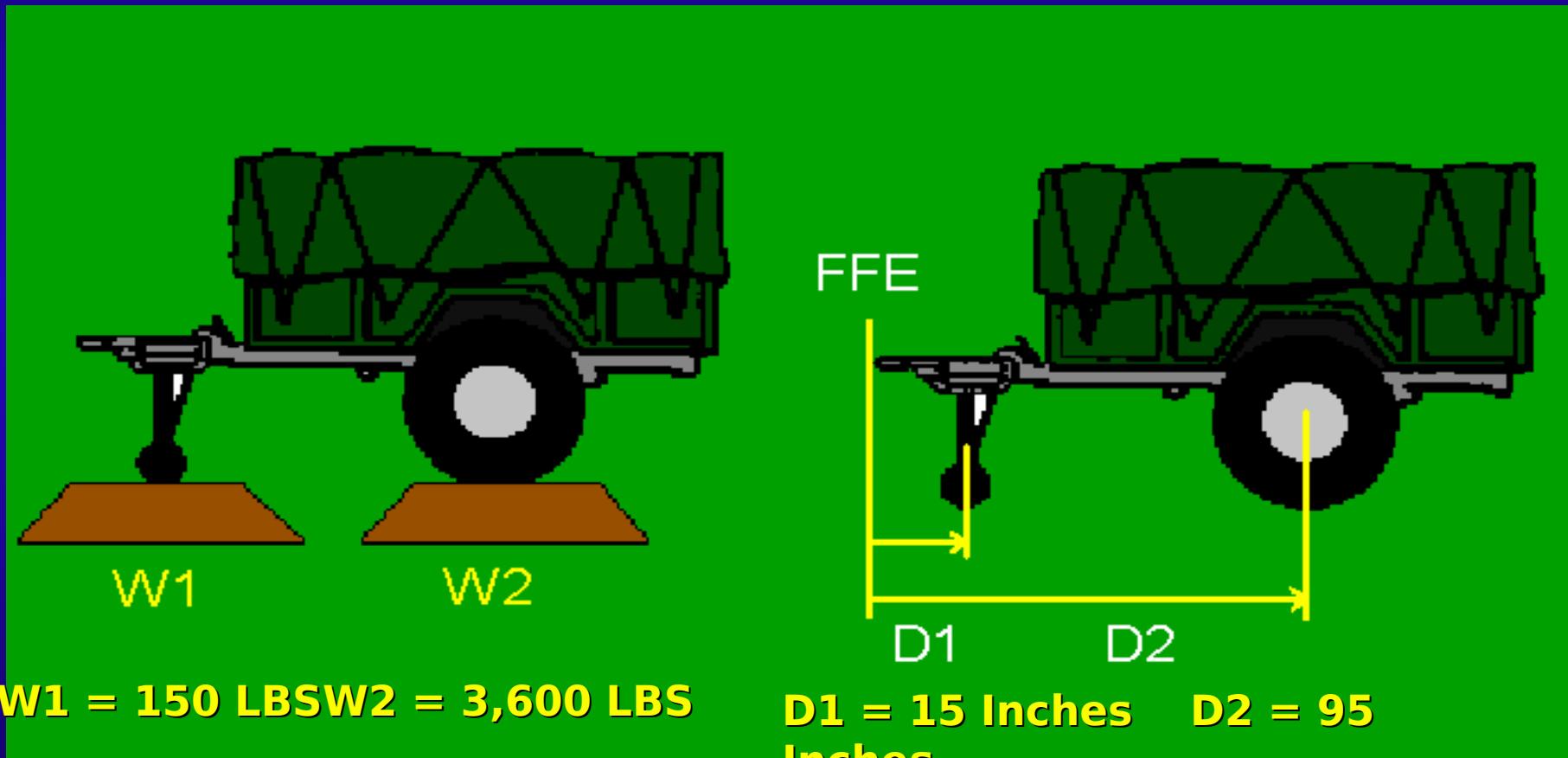
$$222 \times 12,900 = 2,863,800$$

$$276 \times 12,700 = 3,505,200$$

$$\frac{7,244.00}{38,100} = 190 \text{ C/B FFE}$$



# Trailer CB



## Trailer CB (cont)

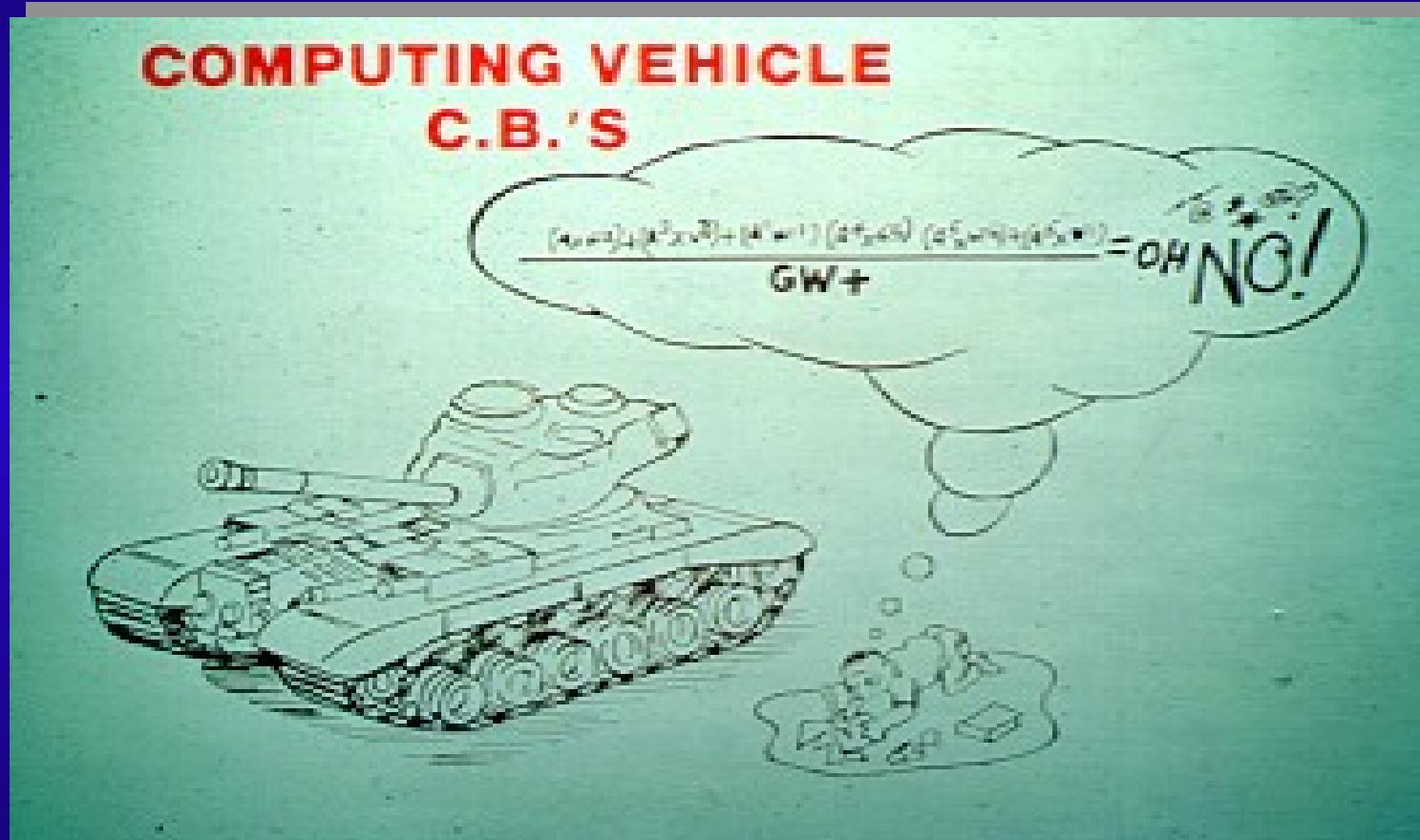
$$CB = \frac{(W1 + D1) + (W2 + D2)}{GW}$$

$$CB = \frac{(150 + 15) + (3,600 + 95)}{3,750}$$

$$CB = \frac{2250 + 342,000}{3,750}$$

$$CB = 91.8 \text{ or } 92 \text{ Inches}$$

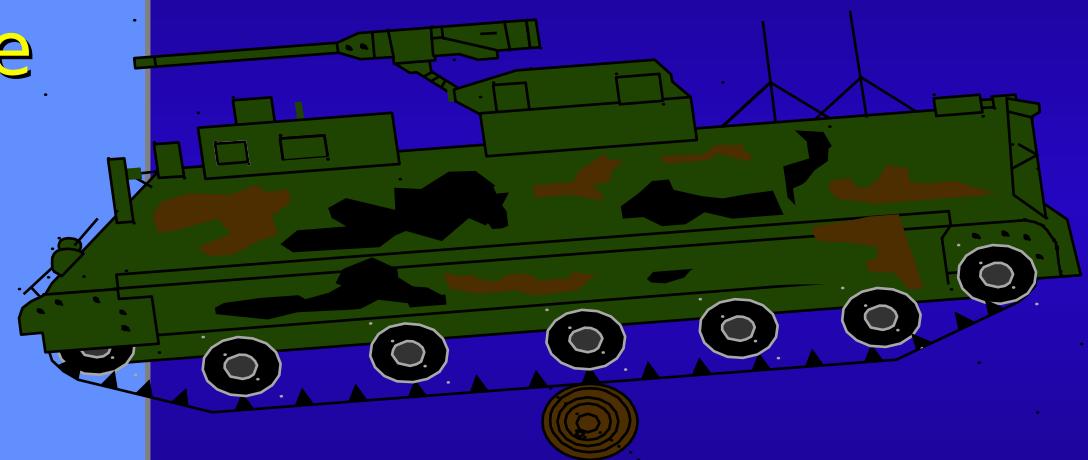
# Tracked Vehicles CB



How do you determine the individual axle weights?

# Tracked Vehicles CB (cont)

- To determine the center of balance for a tracked vehicle, drive the vehicle over an object large enough to allow the vehicle to teeter
- The location of where the vehicle teeters will be marked as the center of balance





# Center of Balance Marking

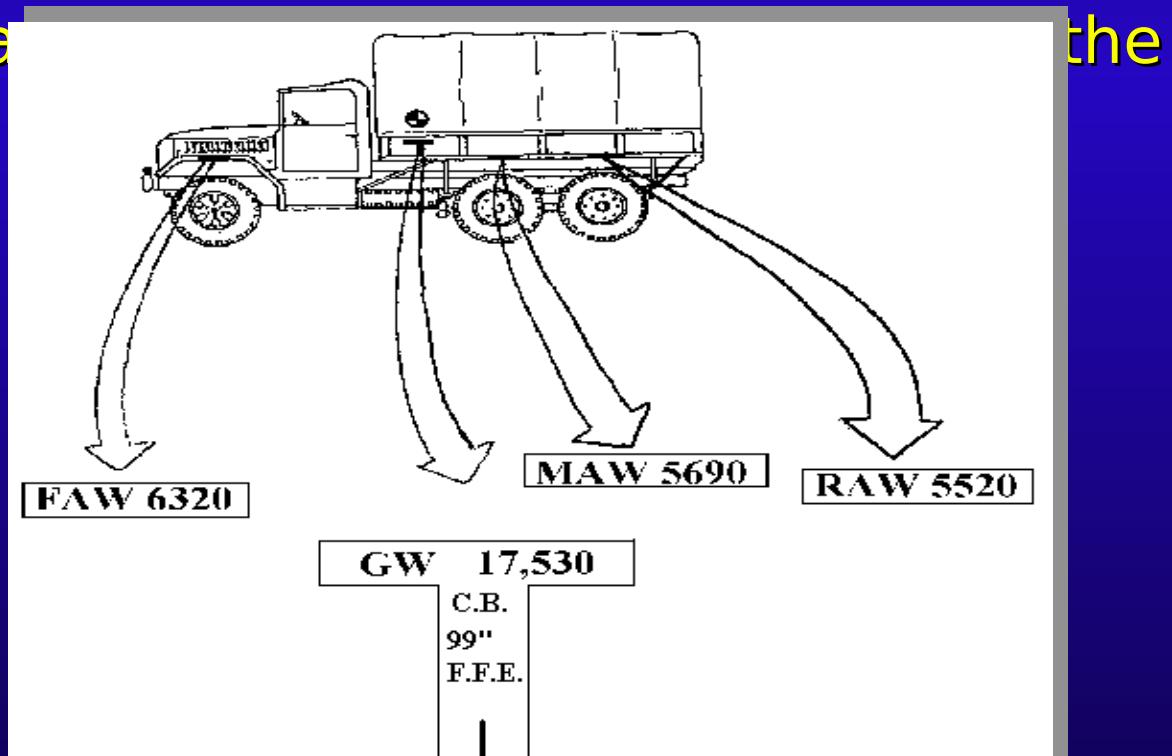
- After computing the CB of the vehicle:

- Mark its location and gross weight on both sides of the vehicle
- Using weather resistant masking tape and grease pencil/magic marker, forming the letter “T”



# Center of Balance Marking (cont)

- “T” marking
  - The horizontal portion of the “T” will contain the gross weight
  - The vertical portion indicates the exact position of CB (indicated by the letter ‘CB’)
  - Indicate number of inches from the RDL to the CB location and mark axle weights at the vehicle

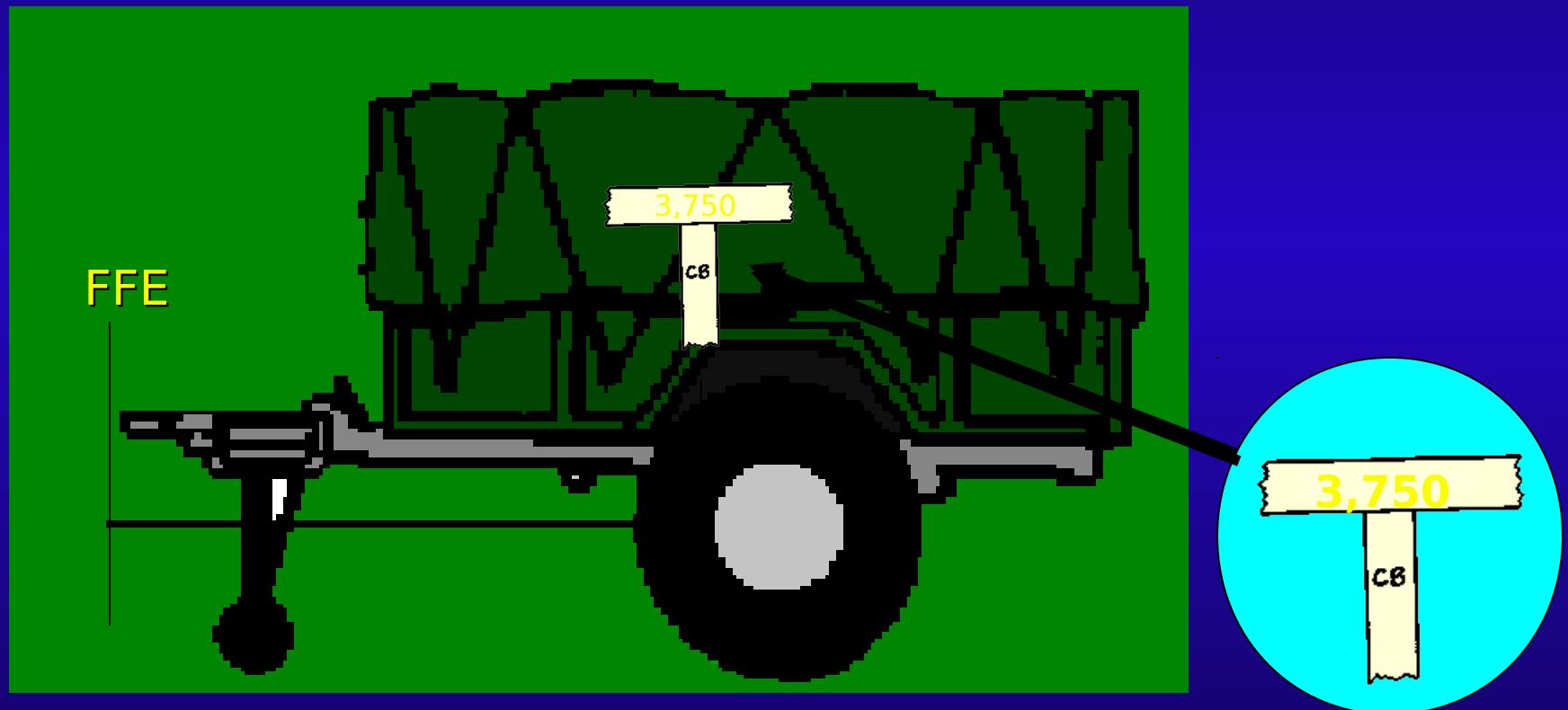


# Center of Balance Marking (cont)



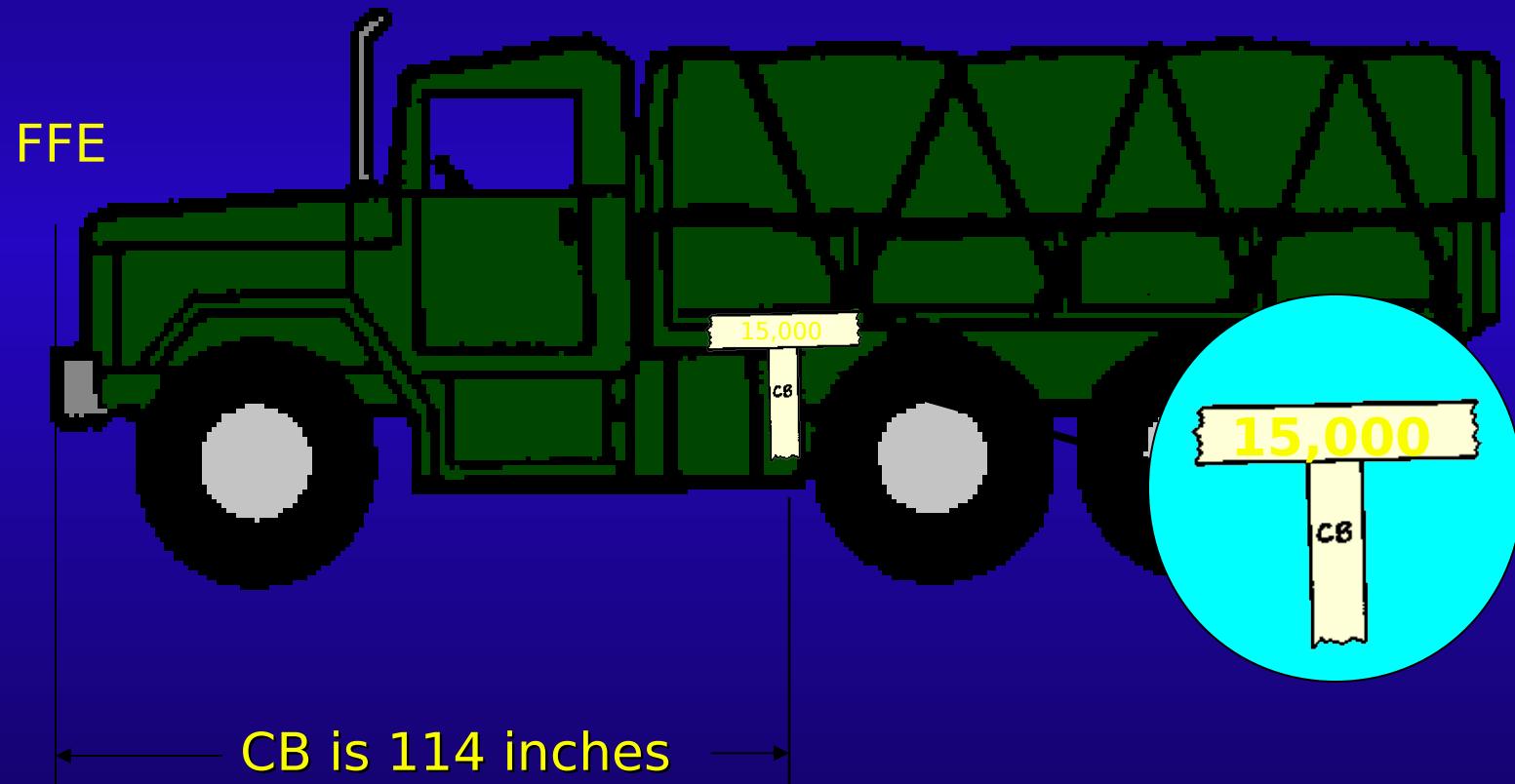
- Equipment that has a cargo carrying capability will
  - Be marked as an empty CB
  - Marked as a loaded CB
- Trucks and towed equipment transported coupled will have an individual CB on each item (allows them to be disconnected and shipped on separate aircraft)
- Items not weighed or marked correctly will not be accepted for shipment

# Center of Balance Marker - Trailer



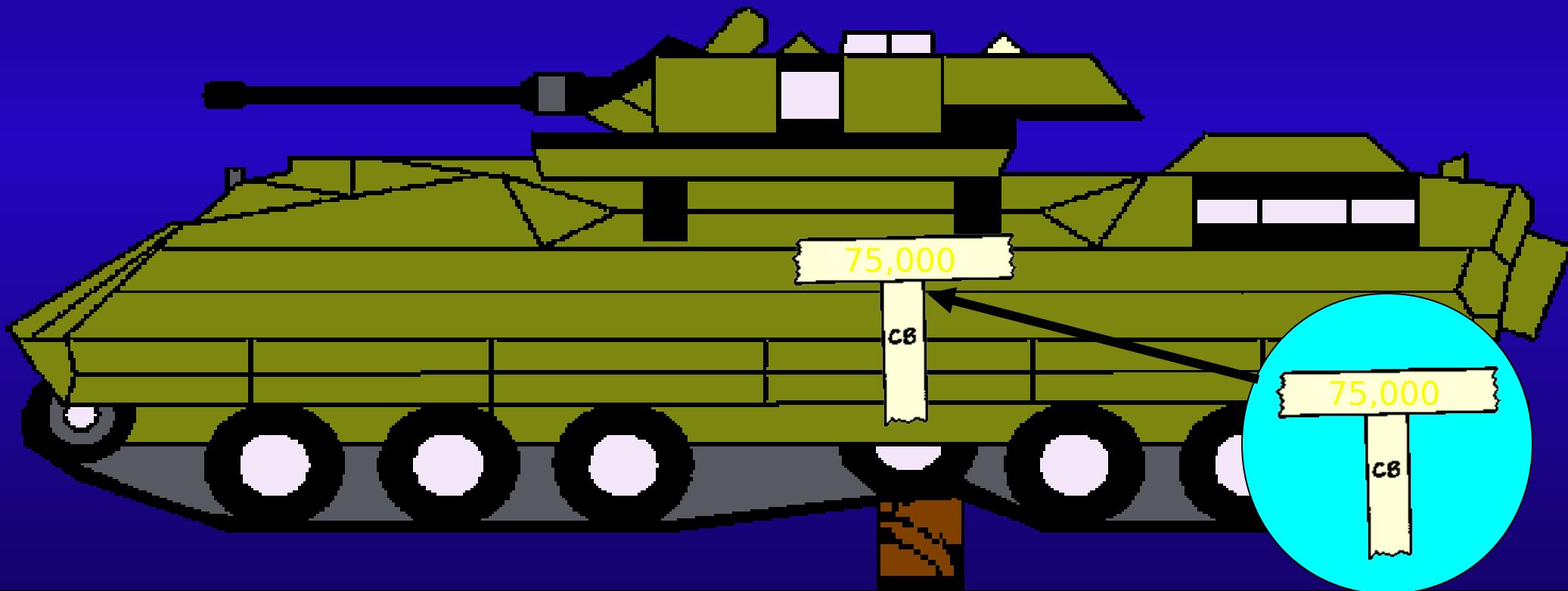
CB is 92 inches from FFE

# Center of Balance Marker - Truck



# Center of Balance Marker - Tracked Vehicles

- Mark CB at balance point

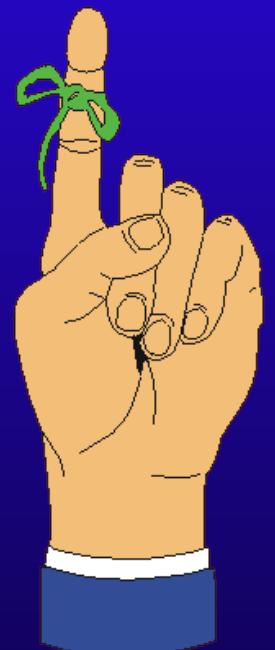




# On Learning

# Summary

- Initial Planning
- Personnel
- Equipment Preparation and Joint Inspection
- Center of Balance



# QUESTIONS?

